CLAIMS

We claim:

1. A variable waveguide attenuator, comprising:

at least one waveguide attenuator cavity;

a fluidic dielectric at least partially disposed within at least one subcavity within said waveguide attenuator cavity, said fluidic dielectric having a loss tangent, a permittivity and a permeability;

at least one composition processor adapted for changing at least one among an electrical characteristic and a physical characteristic of the variable waveguide attenuator by manipulating said fluidic dielectric to vary at least one of a volume, said loss tangent, said permittivity and said permeability of the fluidic dielectric; and

a controller for controlling said composition processor in response to a waveguide attenuator control signal.

2. The variable waveguide attenuator according to claim 1 wherein said composition processor selectively varies concurrently at least two among said volume, said loss tangent, said permittivity and said permeability within the at least one subcavity in response to said waveguide attenuator control signal.

3. The variable waveguide attenuator according to claim 1 wherein the waveguide attenuator has an attenuation and said composition processor selectively varies said loss tangent to vary said attenuation.

4. The variable waveguide attenuator according to claim 1 wherein the waveguide attenuator has an attenuation and said composition processor selectively varies said loss tangent to maintain said attenuation constant as at least one of said permittivity and said permeability is varied.

5. The variable waveguide attenuator according to claim 1 wherein the waveguide attenuator has a characteristic impedance and said composition processor selectively varies said permeability to maintain said characteristic impedance approximately constant when at least one of said loss tangent, said permittivity, and said volume is varied.

6. The variable waveguide attenuator according to claim 1 wherein the waveguide attenuator has a characteristic impedance and said composition processor selectively varies said permeability to adjust said characteristic impedance.

7. The variable waveguide attenuator according to claim 1 wherein the waveguide attenuator has a characteristic impedance and said composition processor selectively varies said permittivity to maintain said characteristic impedance approximately constant when at least one of said loss tangent, said permeability, and said volume is varied.

8. The variable waveguide attenuator according to claim 1 wherein the waveguide attenuator has a characteristic impedance and said composition processor selectively varies said permittivity to adjust said characteristic impedance.

9. The variable waveguide attenuator according to claim 1 wherein a plurality of component parts are dynamically mixed together in said composition processor

responsive to said waveguide attenuator control signal to form said fluidic dielectric.

10. The variable waveguide attenuator according to claim 9 wherein said composition processor further comprises a component part separator adapted for separating said component parts of said fluidic dielectric for subsequent reuse.

11. The variable waveguide attenuator according to claim 1 wherein said composition processor further comprises at least one proportional valve, at least one mixing pump, and at least one conduit for selectively mixing and communicating a plurality of said components of said fluidic dielectric from respective fluid reservoirs to a waveguide attenuator cavity.

12. The variable waveguide attenuator according to claim 1 wherein said fluidic dielectric is comprised of an industrial solvent.

13. The variable waveguide attenuator according to claim 14 wherein said industrial solvent has a suspension of magnetic particles contained therein.

14. The variable waveguide attenuator according to claim 15 wherein said magnetic particles are formed of a material selected from the group consisting of ferrite, metallic salts, and organo-metallic particles.

15. The variable waveguide attenuator according to claim 15 wherein said component contains between about 50% to 90% magnetic particles by weight.

16. The variable waveguide attenuator according to claim 1, further comprising a second waveguide filter cavity.

17. The variable waveguide attenuator according to claim 16, wherein said second waveguide filter cavity is at least partially filled with a second fluidic dielectric.

18. The variable waveguide attenuator according to claim 17, further comprising at least a second composition processor adapted for dynamically changing a composition of said second fluidic dielectric to vary at least one of a volume, a loss tangent, a permittivity and a permeability of said second fluidic dielectric.

19. A method for attenuating an RF signal comprising the steps of:

providing at least one waveguide filter cavity within a waveguide;

at least partially filling said waveguide filter cavity with a fluidic dielectric;

propagating said RF signal within said waveguide; and

dynamically changing at least one among a volume and a composition of said fluidic dielectric to selectively vary at least one of a loss tangent, a permittivity and a permittivity of said fluidic dielectric in response to a waveguide attenuator control signal.

20. The method according to claim 19 further comprising the step of selectively varying at least two among said loss tangent, said permittivity and said permeability concurrently in response to said waveguide attenuator control signal.

21. The method according to claim 19 further comprising the step of varying said loss tangent to vary said attenuation.

22. The method according to claim 19 further comprising the step of varying said loss tangent to maintain said attenuation constant as at least one of said permittivity and said permeability is varied.

23. The method according to claim 19 further comprising the step of selectively varying said permeability to maintain a characteristic impedance of said waveguide attenuator approximately constant when at least one of said loss tangent and said permittivity is varied.

24. The method according to claim 19 further comprising the step of selectively varying said permeability to adjust said characteristic impedance.

25. The method according to claim 19 further comprising the step of selectively varying said permittivity to maintain said characteristic impedance approximately constant when at least one of said loss tangent and said permeability is varied.

26. The method according to claim 19 further comprising the step of selectively varying said permittivity to adjust said characteristic impedance.

27. The method according to claim 19 further comprising the step of dynamically mixing a plurality of components in response to said waveguide attenuator control signal to produce said fluidic dielectric.

28. The method according to claim 27 further comprising the step of separating said components into said component parts for subsequent reuse in forming said fluidic dielectric.

29. The method according to claim 27 further comprising the steps of selectively mixing said components of said fluidic dielectric from respective fluid reservoirs.

30. The method according to claim 19, further comprising the step of providing a second waveguide filter cavity.

31. The method according to claim 30, further comprising the step of at least partially filling said second waveguide filter cavity with a second fluidic dielectric.

32. The method according to claim 31, further comprising the step of providing at least a second composition processor adapted for dynamically changing a composition of said second fluidic dielectric to vary at least one of a loss tangent, a permittivity and a permeability of said second fluidic dielectric.